Winnicentrics

The Royal Astronomical Society of Canada - Winnipeg Centre

Regular meetings of the Winnipeg Centre are normally held in the Robert B. Schultz Lecture Theatre in St. John's College at the University of Manitoba, 92 Dysart Road. Free parking is available in the lot across the street. The theatre is on the lower (basement) floor of the College. Meetings are usually held on the second Friday of each month from 7 p.m. to 10 p.m. After the meetings, members who wish to do so usually retire for pizza and more conversation about astronomical subjects.

However, due to the current restrictions imposed by Manitoba Health for the COVID-19 Pandemic all meetings are being held via Zoom at 7:30 PM on regular meeting nights as above. Regular meetings will resume once restrictions are eliminated and our members can meet in safety. We miss you!

Upcoming Events

RASC Winnipeg Centre Monthly Meetings (via Zoom)

September 11, 2020

October 9, 2020

November 13, 2020

Members' Observing Nights

Cancelled due to COVID

Oak Hammock Marsh Astronomy Night

Resumed without telescopes

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September / October Calendars

Jupiter and Saturn Moons and Red Spot Tables

Comets in September / October

YouTube https://bit.ly/2FrcZJZ

https://bit.ly/3iSmFed

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Gord Tulloch

Observatory Director:
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Winnicentrics is published six times or more each year by the Winnipeg Centre, RASC. Winnicentrics is produced by and for the members of the Winnipeg Centre. Any opinions expressed are those of the author. Any questions or comments please email: newsletter@winnipeg.rasc.ca Or contact one of your Councillors above

Notices:

The Glenlea Observatory LX200 / Dome is CLOSED. Please contact Bryan Stach at bstach@mymts.net or phone 204-295-8506 for current info.

Glenlea Warm Room (2 person limit) and Pad are open to members subject to Social Distancing and Mask requirements.

Members Observing Nights are CANCELLED due to COVID restrictions.

Member Meetings continue to be virtual due to COVID restrictions, please see your email or the RASC Winnipeg Forums for Zoom information.

Boston Pizza after-meeting social events continue to be virtual due to COVID restrictions, please see your email or the RASC Winnipeg Forums for Zoom information.

Visit our web site at:
www.winnipeg.rasc.ca

Winnipeg Centre's 2020 (Socially Distanced) Barbecue

At a time of year when the lack of astronomical twilight makes it hard to see objects in the sky, RASC Winnipeg members got to see… one another! This year's picnic was held at St. Vital Park on Saturday, July 18, giving us the opportunity to get together in person after months of Zoom meetings. Despite a brief downpour right near the end of the get-together, the weather cooperated, and we sat around (six feet apart, of course!) and chatted for a while.

A special thank you to everyone who brought barbecues to the park for everyone to use.

Building An All Sky Camera

By Gord Tulloch, RASC Winnipeg Centre

Part of my Master Plan™ for my observatory is a weather station including an allsky camera that can show me whether there's any cloud and, hopefully, actually be able to tell the observatory that a target is unobscured and able to be observed i.e. "automated sucker hole observing". So when Ontario Telescope accidentally sent me a second ZWO ASI224MC planetary imaging camera (review coming up Real Soon Now) I took the opportunity to negotiate a really good "lets save the shipping" price from them so I could use the camera for an all sky camera. The fact that the ASI224MC is the most popular camera for allsky cameras on the Facebook Allsky Camera group and is well supported by the software I wanted to use made this camera a clear choice.

So what is an Allsky Camera? Basically, a camera that points straight up and with a wide enough field of view to encompass the entire sky. Obviously, this means the the camera needs to be enclosed in a way it will survive the weather 24/7/365. The result is an image like this one:

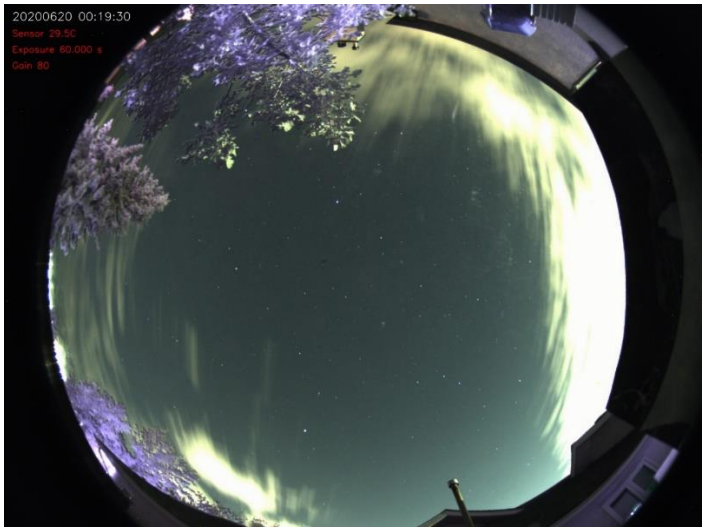


Figure 1 – Sample Allsky Image from the SPAO Allsky Camera

In my case my camera would be situated close to my observatory so it would need to be elevated to get as wide a field view of the sky as possible and as little houses and trees as possible. So a stout pole or pier was required.

After I found a design I liked on the Facebook group I ordered a weatherproof enclosure and 6" transparent dome (figure 2.) The domes are typically used in underwater photography and are relatively inexpensive. My first attempt to order a dome was from a supplier in China and it is apparently still in transit – I eventually gave up and ordered a second dome from the US supplier that was a couple of dollars more but arrived within a week. Lesson learned!

Figure 2 – Weatherproof box and dome

Although the ASI224MC comes with a 2.1mm lens but it would not afford a 180° view so I also ordered a 1.55mm F1.5 fisheye lens from Amazon which would provide horizon to horizon coverage.

Figure 3 – 1.55mm F1.5 fisheye lens

For computing power I chose to embed a Raspberry Pi 3B+ I had lying around – this is still a current model of the Raspberry Pi despite the Raspberry Pi 4 being out. The 3B+ has plenty of computing power to run the camera and a lot more, and has the benefit of being much cooler to run than the Rpi4, which runs much hotter due to it's much faster processing power. With the computer actually being embedded with the camera, it's a bit of a problem getting power to the box up a pole – I wanted to avoid clumsy AC adapters and 120v power going up the pole but since I intended to plug the camera into my ethernet network in the observatory, the solution was simple: Power Over Ethernet (POE.) This standard is commonly used to run remote cameras, wireless access points and so on. And, a POE "hat" was available for the RPi so I could just plug it into the computer and power it through the same ethernet cable that connected it to the network. All that's needed is a POE injector, where you plug the device cable into the injector, and a cable to the network, and the injector provides power through unused conductors in the network cable. At the Raspberry Pi, the power is converted from 48v POE power to the 5v the RPi needs. And now I have plenty of power for not only the Pi and the camera, but the rest of the future weatherstation gear I'll mount on the pole. QED!

Once all the bits and pieces arrived I was able to print a camera mount on my son's 3D printer and get everything mounted in the case (figure 4.) The red line around the dome is a piece of elastic that gets compressed by the screws securing the dome to the case, creating a nice watertight seal. Being a belt and suspenders kind of guy, I also sealed the dome with clear silicon sealant that's easy to cut if I need to get into the dome later but absolutely not going to let any moisture into the enclosure. Of particular concern is condensation on the dome if moisture gets into the enclosure – so far so good. Next time I open the case I'll probably add a bag of dessicant to ensure that any moisture that somehow makes it way into the case is absorbed. The heat from the Rpi and POE hat will likely be enough to keep everything warm enough to operate during the winter but time will tell. So far the entire setup runs at

about 46°C during a 25°C day so it's probably unlikely it will exceed the RPi's 85°C operating ceiling (which would trigger a thermal shutdown to protect the computer.)

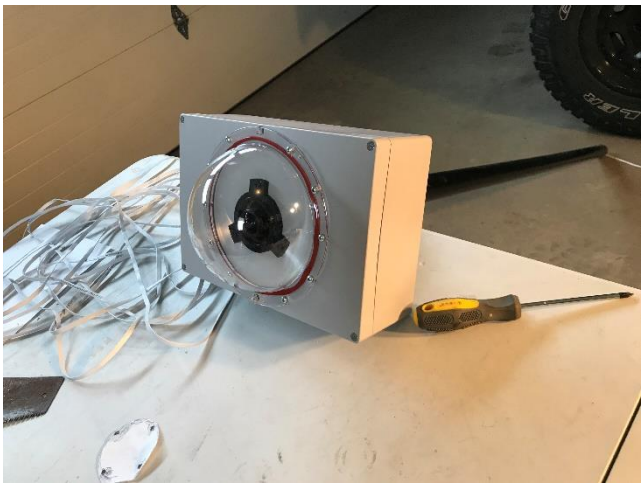


Figure 4 – Completed camera

My initial attempt at putting the camera on a pole mounted on a piece of PVC pipe was a real indicator that I hadn't thought the mounting through real well – the camera box whipped around on the pretty flexible pole and would probably end up with the camera box being catapulted into the farmer's field behind my house in any sort of wind, so a redesign was indicated. As usual, when in doubt, over-engineer the sh** out of the problem so my final solution was 4 2x4s screwed together in an overlapping pattern so I could route the ethernet cable from the camera down to ground level, and trench it under the sod over to the observatory so it wouldn't need to be routed anywhere where it could be cut or otherwise molested.

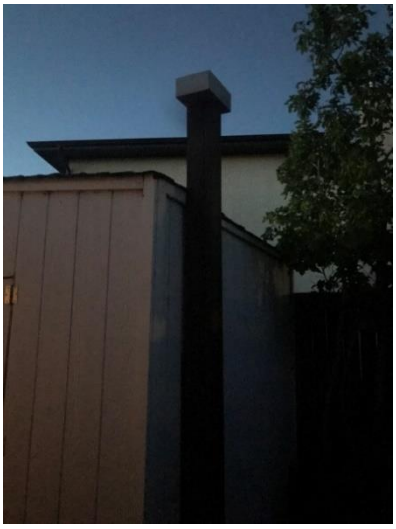


Figure 5 – Camera mount

With the camera assembly mounted on the pole, the only remaining task was to get the software working. The software I chose (which enabled use of the Raspberry Pi) was written by Thomas Jacquin, an amateur astronomer from Yukon NWT. Since the software is open source (located at https://github.com/thomasjacquin/allsky,) not only was it free but I can modify it later to incorporate my weather station hardware. And even better he's developed a web site addon that will display the camera images in almost real-time as well as host time-lapse videos, keeograms (a single image summary of the night's occurrances,) and star trail images. What an amazing contribution!

If you're interested in seeing the resulting web site please feel free to check out http://www.gordtulloch.com/allsky. Clear Skies!

COMET NEOWISE

Ken Tapping, 21st July, 2020

Through binoculars, a few nights ago comet NEOWISE looked like a blurry star which had been smeared upwards by the artist before the paint was dry. At 3:45 am, the sky was already brightening and almost twilight. Against the deep blue the comet was a beautiful sight, even to eyes that were still half-asleep. So what is a comet, and why do astronomers find them so interesting?

When our Solar System formed some 4.5 billion years ago, there was a lot of construction material left over. This is sitting out at the edge of the Solar System as a collection of millions or billions of lumps of dust and ice, typically a few kilometres in diameter, except that few if any of them are actually spherical in shape. Occasionally a collision or near collision between two of these bodies can result in one of them going into a new orbit, taking it into the inner Solar System. Comet NEOWISE is one of those deflected objects.

In the outer Solar System, far beyond Pluto, it is dark and very cold. Bodies lying out there are in a cosmic deep-freeze which can preserve them as unchanged pieces of Solar System construction material for billions of years. It is still extremely difficult to send spacecraft into the outer Solar System. This is one of the reasons we are so interested when a lump of construction material comes into our neighbourhood, which is exactly what is happening now. The new orbit of one of these deflected objects may take it close to the Sun, maybe closer than Mercury or Venus, and then back out to where it came from, and then back into the inner Solar System again.

The object starts its inward trip as a dark lump of dirty ice, containing trapped organic chemicals and other things from the Solar System's birth cloud. As it gets closer to the Sun it warms up. The more volatile chemicals start to evaporate and the ice begins to melt. In the vacuum of space the ice converts directly to water vapour.

Blasts of vapour erupt through the surface, blowing dust into space. Light pressure from the Sun and the solar wind blow the vapours and dust outward from the object. This is lit up by the Sun, and that dark, almost invisible lump of dirty ice becomes surrounded by a glowing envelope and trailing a glowing tail millions of kilometres long. It has become a comet, or "hairy star", one of the most beautiful objects we see in the sky.

In the past, the search for comets has been mostly the province of amateur astronomers. Many of them have had their names attached to the comets, following the tradition of Halley's Comet, Comet Arend-Roland, Hyakutake and Hale-Bopp. The advent of large-field, survey and search instruments over the last decade or so, deployed on the Earth and in space, means that today the amateur comet hunters face some very strong competition. Most new comets are found using these instruments. This new comet was discovered on 27 March, by the Near Earth Object Wide-Field Survey Explorer, NEOWISE. The instrument's primary purpose is to search for near-Earth asteroids, but it is also a good comet finder.

Comets are usually discovered when they are far from the Sun, before they have got into full production of jets of vapour and dust. At that time it is hard to tell whether it will only release a little, in which case it will remain hard to see, or if it will produce huge amounts, possibly

making a spectacle visible to our unaided eyes. Comet NEOWISE was widely expected to be a fizzler. It turns out to have become quite a spectacle.

Search for the comet with binoculars between 11pm and midnight by scanning the sky below and either side of the Big Dipper. Otherwise look in the northeast between 3 and 4 am. Jupiter and Saturn rise around midnight and Mars in the early hours. That searchlight in the east before dawn is Venus. Scan the sky to the left of Venus to find the comet.

Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9. Tel (250) 497-2300, Fax (250) 497-2355 E-mail: ken.tapping@nrc-cnrc.gc.ca

Panorama of noctilucent clouds taken by Judy and Jay Anderson on Canada Day from Assiniboine Park.

GLP-TRAINED USERS AND SPOTTERS
RASC WINNIPEG CENTRE

The following Members have received training in the proper use of Green Laser Pointers and may apply to receive a permit to conduct an astronomy outreach session in accordance with applicable law and RASC policies respecting green laser pointers. For more information see:

9 August 2019 (Expires 8 August 2022)

Abdul al Manni	Patrick Curry	Kaeren Anderson	Kevin Davis
SHR Bannister	Michael Fry	Michelle Boyce	Darren Hennig
Sean Ceaser	LLoyel Hull	Ralph A. Croning	Paul Karlowsky
Clifford Levi	Dennis Lyons	Alan Macklem	Jim Mcdowal
Krzysztof Keller	Daemon Nightshade	Gail Wise	Brian Renaud
Stan Runge	Bryan Stach	Gordon Sharr	

11 August 2019 (Expires 10 August 2022)

Jay Anderson	Judy Anderson

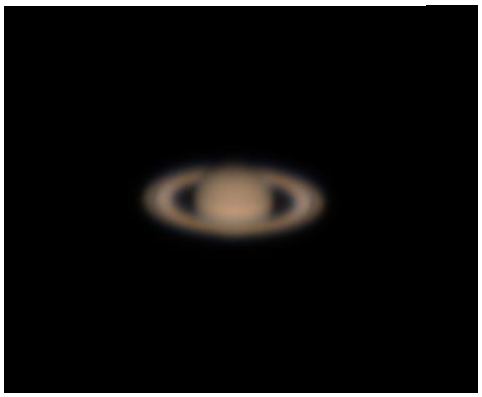
13 December 2019 (Expires 12 December 2022)

Trevor Bryant	Stephen Altstadt	Ed Johnson	Robin Clarke
Adelle Kennedy	Lucille Eustache	Timothy Kennedy	William McDonald
Kevin McGregor	Michelle Paquette		

Members Image Gallery

Darrell Mauthe - M8 the Lagoon nebula. Captured from my front yard outside of Lorette under Bortle 4 skies and is the result of 24x8 minute exposures for a total integration time of 3 hours 12 minutes.

Comet Neowise – Silvia Graca July 5 2020



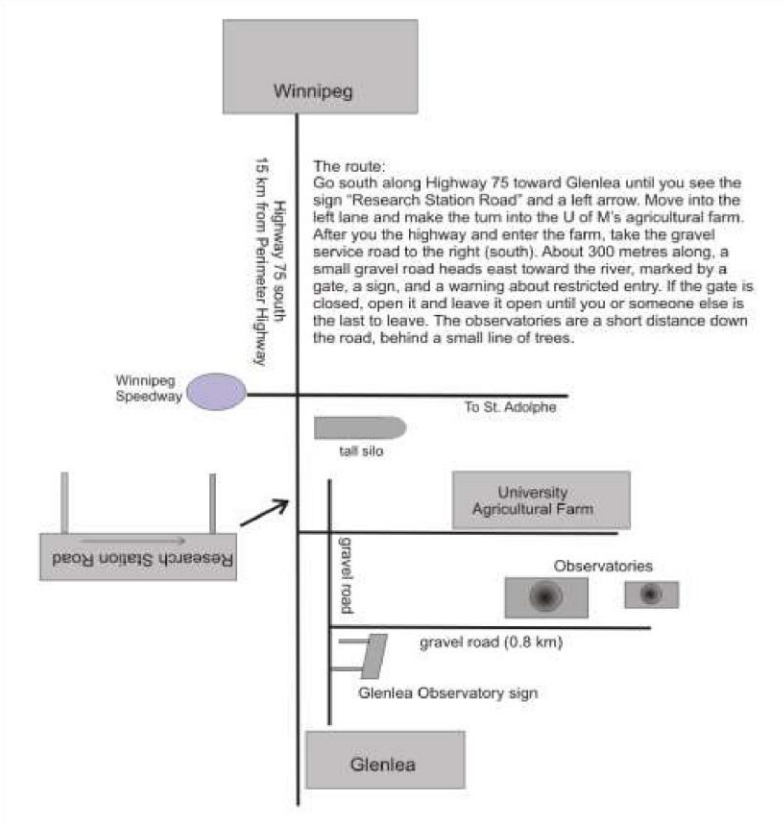
Saturn – Gord Tulloch Aug 2020

Michelle Bovce – Mars Sept 26

Kevin Galka – "NGC 4656 April 2020 with Stephen Altstadt's 16". Total time is 3.7 hours luminance and 100 minutes on each of RGB."

Kevin Galka - NGC 7331 and Stephan's Quintet.

Finding the Observatory



The Winnipeg Centre maintains a working observatory and warm room at the University of Manitoba's Research Farm. The observatory contains a 30 cm Meade telescope on a fork mounting. Members of the Centre may sign out the use of this telescope provided they have first taken a short instruction course on its use.

The Meade provides outstanding views of the night sky. Its large aperture collects more than 1800 times as much light as the human eye. It is capable of magnifying more than 500 times under favourable conditions.

The warm room provides a convenient place for members to take refuge from winter temperatures and summer mosquitoes, or to wait out a passing cloud. The building also provides desk space and lighting for planning a night's observing session. A cement pad in front of the warm room and observatory provides a convenient space to place members' telescopes while conducting personal observing programs.

Etiquette requires that you approach the observing site with your headlights off if that's possible on your model of car. Headlights should remain off, but you can still use your parking lights to drive. Proceed slowly, and be careful about parked cars along the road, or people walking. If you cannot turn off your headlights, make a cardboard or garbage bag mask to dim the lights. You might wish to turn around at the end of the road so that you are facing the direction back toward the highway at the end of the evening.

Remember to close the gate if you are the last one to leave.

September 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2 Corn Moon Moon occults Tau Aqr Pallas changes direction	3 Northern Winter begins on Mars	4	5 Moon near Mars Sunrise 6:50am Sunset 8:10pm
6 Moon near Uranus	7	8	9 Mars stationary	10	11 Moon near M44 Neptune Opposition	12 Jupiter stationary Sunrise 7:00am Sunset 7:47pm
13 Minima of Algol	14 Moon near Venus and M44 6:57UT Dbl transit on Jupiter	15	16 Zodiacal light in east next 2 weeks	17	18 Moon near Mercury	19 Sunrise 7:11am Sunset 7:31pm
20	21 Mercury near Spica	22 Autumnal Equinox Venus near Vesta	23 Moon nearing Jupiter	24 Moon near Jupiter	25 Moon near Saturn	26 Sunrise 7:21am Sunset 7:16pm
27 Sinus Iridum's Golden Handle On Moon	28	29 Saturn stationary	30			

(Jupiter/Saturn Image Credit NASA/GSFC)

October 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 Mercury at greatest elongation (25.8°)	2	3	4	5 Sunrise 7:29am Sunset 7:05pm
6	7 Draconids Meteor Shower	8	9	10	11	12 Sunrise 7:46am Sunset 6:42pm
13 Mars at Opposition	14	15	16	17	18	19 Sunrise 7:57am Sunset 6:28pm
20	21 Orionids Meteor Shower	22 Orionids Meteor Shower	23	24	25	26 Sunrise 8:09am Sunset 6:15pm
27	28	29 Southern Taurids Meteor Shower	30 Southern Taurids Meteor Shower	31 Blue Moon Uranus at Opposition		

(Mars Image credit: NASA/ESA/STScI)

I : Ecl end : 1 Sep 2020 1:52
II : Tra start: 1 Sep 2020 5:28
II : Sha start: 1 Sep 2020 7:32
II : Tra end : 1 Sep 2020 8:16
II : Sha end : 1 Sep 2020 10:22
I : Tra start: 1 Sep 2020 19:53
III: Occ start: 1 Sep 2020 20:20
I : Sha start: 1 Sep 2020 20:56
I : Tra end : 1 Sep 2020 22:09
I : Sha end : 1 Sep 2020 23:13
III: Occ end : 1 Sep 2020 23:41
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I : Occ start: 2 Sep 2020 17:01
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II : Sha start: 8 Sep 2020 10:08
II : Tra end : 8 Sep 2020 10:41
II : Sha end : 8 Sep 2020 12:58
I : Tra start: 8 Sep 2020 21:43
I : Sha start: 8 Sep 2020 22:51
III: Occ start: 8 Sep 2020 23:59
I : Tra end : 8 Sep 2020 23:59
I : Sha end : 9 Sep 2020 1:08
III: Occ end : 9 Sep 2020 3:19
III: Ecl start: 9 Sep 2020 4:34
III: Ecl end : 9 Sep 2020 8:00
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I : Tra end : 10 Sep 2020 18:27
I : Sha end : 10 Sep 2020 19:37
I : Occ start: 11 Sep 2020 13:18
I : Ecl end : 11 Sep 2020 16:45
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II : Sha start: 11 Sep 2020 23:27
II : Tra end : 11 Sep 2020 23:54
II : Sha end : 12 Sep 2020 2:17
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III: Occ end : 23 Sep 2020 10:51
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II : Tra start: 26 Sep 2020 2:06
II : Sha start: 26 Sep 2020 4:40
II : Tra end : 26 Sep 2020 4:54
II : Sha end : 26 Sep 2020 7:31
I : Tra start: 26 Sep 2020 14:23
I : Sha start: 26 Sep 2020 15:40
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I : Ecl end : 29 Sep 2020 9:33
II : Tra start: 29 Sep 2020 15:22
II : Sha start: 29 Sep 2020 17:58
II : Tra end : 29 Sep 2020 18:11

Jupiter's Moons Events in September 2020

Here are times for the shadow, transit, occultation, and eclipse events for Jupiter's four major satellites over the above time period.

I = Io = innermost satellite
II = Europa
III = Ganymede
IV = Callisto = outermost satellite

All times are in Universal Time (UT). To convert to Central Time subtract 5 hours if CDT, 6 if CST.

Data courtesy of www.projectpluto.com

II : Sha end : 29 Sep 2020 20:49
I : Tra start: 30 Sep 2020 3:19
I : Sha start: 30 Sep 2020 4:38
I : Tra end : 30 Sep 2020 5:36
I : Sha end : 30 Sep 2020 6:55
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I : Ecl end : 2 Oct 2020 22:31
II : Tra start: 3 Oct 2020 4:39
II : Sha start: 3 Oct 2020 7:17
II : Tra end : 3 Oct 2020 7:28
II : Sha end : 3 Oct 2020 10:08
I : Tra start: 3 Oct 2020 16:16
I : Sha start: 3 Oct 2020 17:35
I : Tra end : 3 Oct 2020 18:33
I : Sha end : 3 Oct 2020 19:52
III: Tra start: 4 Oct 2020 1:15
III: Tra end : 4 Oct 2020 4:38
III: Sha start: 4 Oct 2020 6:33
III: Sha end : 4 Oct 2020 10:03
I : Occ start: 4 Oct 2020 13:24
I : Ecl end : 4 Oct 2020 17:00
II : Occ start: 4 Oct 2020 23:49
II : Ecl end : 5 Oct 2020 5:17
I : Tra start: 5 Oct 2020 10:45
I : Sha start: 5 Oct 2020 12:04
I : Tra end : 5 Oct 2020 13:02
I : Sha end : 5 Oct 2020 14:21
I : Occ start: 6 Oct 2020 7:53
I : Ecl end : 6 Oct 2020 11:29
II : Tra start: 6 Oct 2020 17:57
II : Sha start: 6 Oct 2020 20:35
II : Tra end : 6 Oct 2020 20:46
II : Sha end : 6 Oct 2020 23:27
I : Tra start: 7 Oct 2020 5:14
I : Sha start: 7 Oct 2020 6:33
I : Tra end : 7 Oct 2020 7:30
I : Sha end : 7 Oct 2020 8:50
III: Occ start: 7 Oct 2020 15:18
III: Occ end : 7 Oct 2020 18:40
III: Ecl start: 7 Oct 2020 20:35
III: Ecl end : 8 Oct 2020 0:04
I : Occ start: 8 Oct 2020 2:22
I : Ecl end : 8 Oct 2020 5:58
II : Occ start: 8 Oct 2020 13:06
II : Ecl end : 8 Oct 2020 18:36
IV : Occ start: 8 Oct 2020 23:32
I : Tra start: 8 Oct 2020 23:43
I : Sha start: 9 Oct 2020 1:02
I : Tra end : 9 Oct 2020 1:59
I : Sha end : 9 Oct 2020 3:19
IV : Occ end : 9 Oct 2020 3:43
IV : Ecl start: 9 Oct 2020 11:51
IV : Ecl end : 9 Oct 2020 16:22
I : Occ start: 9 Oct 2020 20:50
I : Ecl end : 10 Oct 2020 0:27
II : Tra start: 10 Oct 2020 7:15
II : Sha start: 10 Oct 2020 9:54
II : Tra end : 10 Oct 2020 10:04
II : Sha end : 10 Oct 2020 12:46
I : Tra start: 10 Oct 2020 18:11
I : Sha start: 10 Oct 2020 19:31
I : Tra end : 10 Oct 2020 20:28
I : Sha end : 10 Oct 2020 21:48
III: Tra start: 11 Oct 2020 5:15
III: Tra end : 11 Oct 2020 8:38
III: Sha start: 11 Oct 2020 10:34
III: Sha end : 11 Oct 2020 14:04
I : Occ start: 11 Oct 2020 15:19
I : Ecl end : 11 Oct 2020 18:56
II : Occ start: 12 Oct 2020 2:25
II : Ecl end : 12 Oct 2020 7:54
I : Tra start: 12 Oct 2020 12:40
I : Sha start: 12 Oct 2020 13:59
I : Tra end : 12 Oct 2020 14:57
I : Sha end : 12 Oct 2020 16:16
I : Occ start: 13 Oct 2020 9:48
I : Ecl end : 13 Oct 2020 13:24
II : Tra start: 13 Oct 2020 20:33
II : Sha start: 13 Oct 2020 23:12
II : Tra end : 13 Oct 2020 23:23
II : Sha end : 14 Oct 2020 2:04
I : Tra start: 14 Oct 2020 7:09
I : Sha start: 14 Oct 2020 8:28
I : Tra end : 14 Oct 2020 9:26
I : Sha end : 14 Oct 2020 10:45
III: Occ start: 14 Oct 2020 19:19
III: Occ end : 14 Oct 2020 22:41
III: Ecl start: 15 Oct 2020 0:35
III: Ecl end : 15 Oct 2020 4:05
I : Occ start: 15 Oct 2020 4:17
I : Ecl end : 15 Oct 2020 7:53
II : Occ start: 15 Oct 2020 15:44
II : Ecl end : 15 Oct 2020 21:12
I : Tra start: 16 Oct 2020 1:38
I : Sha start: 16 Oct 2020 2:57
I : Tra end : 16 Oct 2020 3:55
I : Sha end : 16 Oct 2020 5:14
I : Occ start: 16 Oct 2020 22:46
I : Ecl end : 17 Oct 2020 2:22
IV : Tra start: 17 Oct 2020 6:50
II : Tra start: 17 Oct 2020 9:53
IV : Tra end : 17 Oct 2020 11:03
II : Sha start: 17 Oct 2020 12:31
II : Tra end : 17 Oct 2020 12:42
II : Sha end : 17 Oct 2020 15:23
IV : Sha start: 17 Oct 2020 19:12
I : Tra start: 17 Oct 2020 20:07
I : Sha start: 17 Oct 2020 21:26
I : Tra end : 17 Oct 2020 22:24
I : Sha end : 17 Oct 2020 23:43
IV : Sha end : 17 Oct 2020 23:45
III: Tra start: 18 Oct 2020 9:18
III: Tra end : 18 Oct 2020 12:41
III: Sha start: 18 Oct 2020 14:35
I : Occ start: 18 Oct 2020 17:15
III: Sha end : 18 Oct 2020 18:05
I : Ecl end : 18 Oct 2020 20:51
II : Occ start: 19 Oct 2020 5:03
II : Ecl end : 19 Oct 2020 10:31
I : Tra start: 19 Oct 2020 14:36
I : Sha start: 19 Oct 2020 15:55
I : Tra end : 19 Oct 2020 16:53
I : Sha end : 19 Oct 2020 18:12
I : Occ start: 20 Oct 2020 11:45
I : Ecl end : 20 Oct 2020 15:20
II : Tra start: 20 Oct 2020 23:12
II : Sha start: 21 Oct 2020 1:50
II : Tra end : 21 Oct 2020 2:02
II : Sha end : 21 Oct 2020 4:42
I : Tra start: 21 Oct 2020 9:06
I : Sha start: 21 Oct 2020 10:24
I : Tra end : 21 Oct 2020 11:22
I : Sha end : 21 Oct 2020 12:41
III: Occ start: 21 Oct 2020 23:24
III: Occ end : 22 Oct 2020 2:48
III: Ecl start: 22 Oct 2020 4:37
I : Occ start: 22 Oct 2020 6:14
III: Ecl end : 22 Oct 2020 8:07
I : Ecl end : 22 Oct 2020 9:49
II : Occ start: 22 Oct 2020 18:23
II : Ecl end : 22 Oct 2020 23:49
I : Tra start: 23 Oct 2020 3:35
I : Sha start: 23 Oct 2020 4:52
I : Tra end : 23 Oct 2020 5:51
I : Sha end : 23 Oct 2020 7:09
I : Occ start: 24 Oct 2020 0:43
I : Ecl end : 24 Oct 2020 4:18
II : Tra start: 24 Oct 2020 12:33
II : Sha start: 24 Oct 2020 15:08
II : Tra end : 24 Oct 2020 15:23
II : Sha end : 24 Oct 2020 18:01
I : Tra start: 24 Oct 2020 22:04
I : Sha start: 24 Oct 2020 23:21
I : Tra end : 25 Oct 2020 0:21
I : Sha end : 25 Oct 2020 1:38
III: Tra start: 25 Oct 2020 13:24
III: Tra end : 25 Oct 2020 16:48
IV : Occ start: 25 Oct 2020 18:00
III: Sha start: 25 Oct 2020 18:35
I : Occ start: 25 Oct 2020 19:12
III: Sha end : 25 Oct 2020 22:06
IV : Occ end : 25 Oct 2020 22:15
I : Ecl end : 25 Oct 2020 22:47
IV : Ecl start: 26 Oct 2020 5:59
II : Occ start: 26 Oct 2020 7:43
IV : Ecl end : 26 Oct 2020 10:33
II : Ecl end : 26 Oct 2020 13:07
I : Tra start: 26 Oct 2020 16:33
I : Sha start: 26 Oct 2020 17:50
I : Tra end : 26 Oct 2020 18:50
I : Sha end : 26 Oct 2020 20:07
I : Occ start: 27 Oct 2020 13:42
I : Ecl end : 27 Oct 2020 17:16
II : Tra start: 28 Oct 2020 1:53
II : Sha start: 28 Oct 2020 4:27
II : Tra end : 28 Oct 2020 4:43
II : Sha end : 28 Oct 2020 7:20
I : Tra start: 28 Oct 2020 11:03
I : Sha start: 28 Oct 2020 12:19
I : Tra end : 28 Oct 2020 13:19
I : Sha end : 28 Oct 2020 14:36
III: Occ start: 29 Oct 2020 3:33
III: Occ end : 29 Oct 2020 6:57
I : Occ start: 29 Oct 2020 8:11
III: Ecl start: 29 Oct 2020 8:38
I : Ecl end : 29 Oct 2020 11:45
III: Ecl end : 29 Oct 2020 12:08
II : Occ start: 29 Oct 2020 21:03
II : Ecl end : 30 Oct 2020 2:25
I : Tra start: 30 Oct 2020 5:32
I : Sha start: 30 Oct 2020 6:48
I : Tra end : 30 Oct 2020 7:49
I : Sha end : 30 Oct 2020 9:05
I : Occ start: 31 Oct 2020 2:41
I : Ecl end : 31 Oct 2020 6:13
II : Tra start: 31 Oct 2020 15:15
II : Sha start: 31 Oct 2020 17:46
II : Tra end : 31 Oct 2020 18:05
II : Sha end : 31 Oct 2020 20:39

Jupiter's Moons Events in October 2020

Here are times for the shadow, transit, occultation, and eclipse events for Jupiter's four major satellites over the above time period.

I = Io = innermost satellite
II = Europa
III = Ganymede
IV = Callisto = outermost satellite

All times are in Universal Time (UT). To convert to Central Time subtract 5 hours if CDT, 6 if CST.

Data courtesy of www.projectpluto.com

1 Sep 2020 2:43
1 Sep 2020 12:38
1 Sep 2020 22:34
2 Sep 2020 8:30
2 Sep 2020 18:25
3 Sep 2020 4:21
3 Sep 2020 14:17
4 Sep 2020 0:12
4 Sep 2020 10:08
4 Sep 2020 20:04
5 Sep 2020 6:00
5 Sep 2020 15:55
6 Sep 2020 1:51
6 Sep 2020 11:47
6 Sep 2020 21:42
7 Sep 2020 7:38
7 Sep 2020 17:34
8 Sep 2020 3:30
8 Sep 2020 13:25
8 Sep 2020 23:21
9 Sep 2020 9:17
9 Sep 2020 19:12
10 Sep 2020 5:08
10 Sep 2020 15:04
11 Sep 2020 1:00
11 Sep 2020 10:55
11 Sep 2020 20:51
12 Sep 2020 6:47
12 Sep 2020 16:42
13 Sep 2020 2:38
13 Sep 2020 12:34
13 Sep 2020 22:30
14 Sep 2020 8:25
14 Sep 2020 18:21
15 Sep 2020 4:17
15 Sep 2020 14:12
16 Sep 2020 0:08
16 Sep 2020 10:04
16 Sep 2020 20:00
17 Sep 2020 5:55
17 Sep 2020 15:51
18 Sep 2020 1:47
18 Sep 2020 11:43
18 Sep 2020 21:38
19 Sep 2020 7:34
19 Sep 2020 17:30
20 Sep 2020 3:26
20 Sep 2020 13:21
20 Sep 2020 23:17
21 Sep 2020 9:13
21 Sep 2020 19:09
22 Sep 2020 5:04
22 Sep 2020 15:00
23 Sep 2020 0:56
23 Sep 2020 10:52
23 Sep 2020 20:47
24 Sep 2020 6:43
24 Sep 2020 16:39
25 Sep 2020 2:35
25 Sep 2020 12:30
25 Sep 2020 22:26
26 Sep 2020 8:22
26 Sep 2020 18:18
27 Sep 2020 4:13
27 Sep 2020 14:09
28 Sep 2020 0:05
28 Sep 2020 10:01
28 Sep 2020 19:56
29 Sep 2020 5:52
29 Sep 2020 15:48
30 Sep 2020 1:44
30 Sep 2020 11:39
30 Sep 2020 21:35
1 Oct 2020 7:31
1 Oct 2020 17:27
2 Oct 2020 3:23
2 Oct 2020 13:18
2 Oct 2020 23:14
3 Oct 2020 9:10
3 Oct 2020 19:06
4 Oct 2020 5:01
4 Oct 2020 14:57
5 Oct 2020 0:53
5 Oct 2020 10:49
5 Oct 2020 20:44
6 Oct 2020 6:40
6 Oct 2020 16:36
7 Oct 2020 2:32
7 Oct 2020 12:28
7 Oct 2020 22:23
8 Oct 2020 8:19
8 Oct 2020 18:15
9 Oct 2020 4:11
9 Oct 2020 14:07
10 Oct 2020 0:02
10 Oct 2020 9:58
10 Oct 2020 19:54
11 Oct 2020 5:50
11 Oct 2020 15:45
12 Oct 2020 1:41
12 Oct 2020 11:37
12 Oct 2020 21:33
13 Oct 2020 7:29
13 Oct 2020 17:24
14 Oct 2020 3:20
14 Oct 2020 13:16
14 Oct 2020 23:12
15 Oct 2020 9:08
15 Oct 2020 19:03
16 Oct 2020 4:59
16 Oct 2020 14:55
17 Oct 2020 0:51
17 Oct 2020 10:47
17 Oct 2020 20:42
18 Oct 2020 6:38
18 Oct 2020 16:34
19 Oct 2020 2:30
19 Oct 2020 12:26
19 Oct 2020 22:21
20 Oct 2020 8:17
20 Oct 2020 18:13
21 Oct 2020 4:09
21 Oct 2020 14:05
22 Oct 2020 0:00
22 Oct 2020 9:56
22 Oct 2020 19:52
23 Oct 2020 5:48
23 Oct 2020 15:44
24 Oct 2020 1:39
24 Oct 2020 11:35
24 Oct 2020 21:31
25 Oct 2020 7:27
25 Oct 2020 17:23
26 Oct 2020 3:19
26 Oct 2020 13:14
26 Oct 2020 23:10
27 Oct 2020 9:06
27 Oct 2020 19:02
28 Oct 2020 4:58
28 Oct 2020 14:53
29 Oct 2020 0:49
29 Oct 2020 10:45
29 Oct 2020 20:41
30 Oct 2020 6:37
30 Oct 2020 16:33
31 Oct 2020 2:28
31 Oct 2020 12:24
31 Oct 2020 22:20

Great Red Spot

Transits in Sep/Oct 2020

Here are times for the transit of the Great Red Spot over the above time period. A transit is when the middle of the Spot passes through the middle latitude of the planet.

All times are in Universal Time (UT). To convert to Central Time subtract 5 hours if CDT, 6 if CST.

Data courtesy of www.projectpluto.com

Comets in September and October

This section lists all of the comets that are prominent in the sky, the visual magnitude and the declination of the comet. Brighter comets (lower magnitude) at higher declinations (higher h) are the best candidates to observe.

Month	Evening			Midnight			Morning		
	Comet	Mag	h	Comet	Mag	h	Comet	Mag	h
2020 Sep	88P/Howell	8	15	C/2020 M3 (ATLAS)	10	4	C/2020 M3 (ATLAS)	10	22
	C/2020 F3 (NEOWISE)	9	20	C/2020 Q1 (Borisov)	12	57	C/2020 K8 (Catalina-ATLAS)	10	10
	C/2017 T2 (PanSTARRS)	10	21	29P/Schwassmann-Wachmann 1	13	59	C/2020 Q1 (Borisov)	12	69
	C/2019 U6 (Lemmon)	12	45				29P/Schwassmann-Wachmann 1	13	83
	C/2020 Q1 (Borisov)	12	61						
	C/2019 N1 (ATLAS)	13	12						
	29P/Schwassmann-Wachmann 1	13	3						
2020 Oct	88P/Howell	8	19	C/2020 M3 (ATLAS)	9	29	C/2020 P1 (NEOWISE)	9	5
	C/2017 T2 (PanSTARRS)	11	9	29P/Schwassmann-Wachmann 1	13	83	C/2020 M3 (ATLAS)	9	42
	C/2020 F3 (NEOWISE)	11	8	C/2020 Q1 (Borisov)	13	52	29P/Schwassmann-Wachmann 1	13	83
	29P/Schwassmann-Wachmann 1	13	22				C/2020 Q1 (Borisov)	13	19

Data courtesy of Seiichi Yoshida (http://www.aerith.net/comet/future-n.html)

Next page: Ian Dixon – "About 75 min on M33... about 20 min south of Glenlea. This is an experiment with my modded camera, it may need some processing to calm down the yellows."